FUSIFORM RUST: ILLUSTRATION OF DIFFERENT SYMPTOMS IN THE GREENHOUSE AND FIELD

C. H. Walkinshaw
R. L. Anderson

ABSTRACT

This paper describes 7 fusiform rust symptom types found on seedlings in the greenhouse and 8 on five-year-old trees in the field.

INTRODUCTION

The incidence of fusiform rust, caused by Cronartium quercuum Berk. Miyabe Shirai f. sp. fusiforme, symptom types varies with the inoculum source, inoculum density, age of host, species, geographic location, and environmental conditions before and after infection has occurred.

In the past, galled or non-galled seedlings have been the criteria for greenhouse and field evaluation of rust-infected seedlings and trees. In 1981, the Forest Service at Gulfport, Miss., and the Resistance Screening Center adopted different symptom types to evaluate the relative resistance of slash pine families to the rust. This process has dramatically improved the correlation between greenhouse and field tests. These new variables also are being applied to loblolly pine tests. Another index will be developed for ranking resistance of loblolly pines.

In 1982, a study was undertaken to determine if a variety of symptom types could be measured in the field. These might provide improved discrimination of rust resistance in plantations.

This paper illustrates and describes different symptoms that are found on pine seedlings. Both greenhouse and field symptoms are shown. A number of these symptom types appear more useful than percentage galled for comparing resistant trees.

SYMPTOMS, WITHOUT SWELLING

This photograph illustrates the character SYMPTOMS, WITHOUT SWELLING. These trees have an area of purplish discoloration and/or a needle base with purple discoloration. The normal green tissue surrounding these areas of discoloration may be slightly swollen and still be classified as this symptom type. Fungus tissue is not present in symptoms of this type.

TYPICAL GALL - GREENHOUSE

Example of a TYPICAL GALL. It is typical because there is swelling around the entire circumference of the stem. ATYPICAL GALL is one that does not go around the entire circumference of the stem.

TYPICAL GALL - FIELD

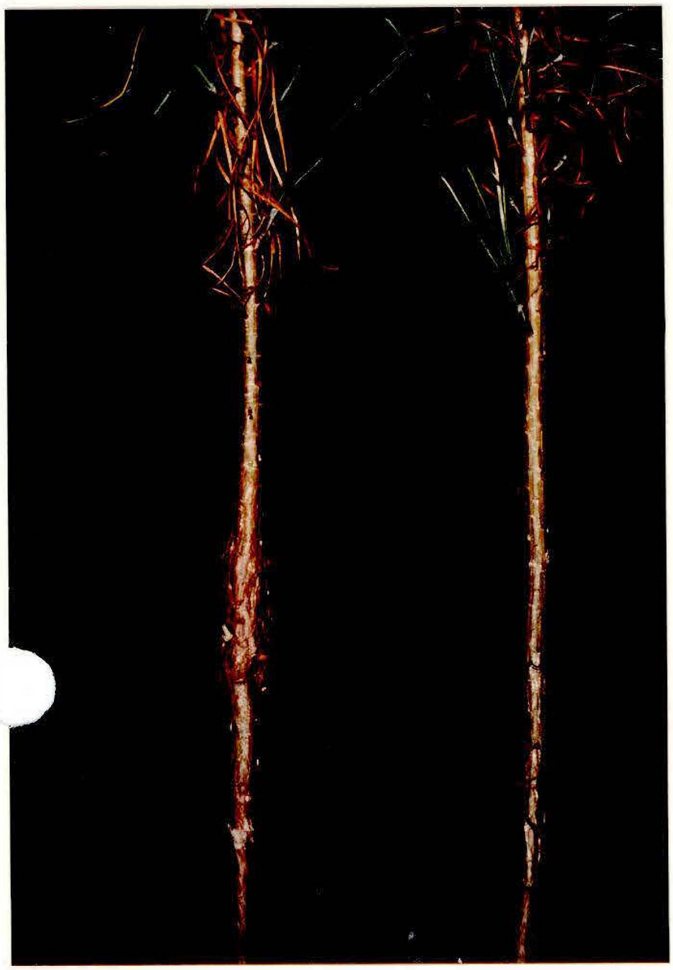
Stem gall on five-year-old slash pine in a field test in northern Florida. Gall has encircled the stem.

FAT GALL - GREENHOUSE

The seedling in this photograph would be classified as FAT, because the gall is twice the diameter the stem would have ordinarily have been.

FAT GALL - FIELD

This five-year-old slash pine has a large diameter gall encircling its base. Note orange aeciospore production on gall surface.



LESS THAN 25MM IN LENGTH GALL

Before enlargement, the gall on the left was LESS THAN or equal to 25MM IN LENGTH. The seedling on the right is gall free.

SMALL, THIN GALL - FIELD

Gall on five-year-old seedling has remained small and one-sided. Shortest interval between lines on background is 50mm.

BASEBALL BAT - GREENHOUSE

Stem constriction and upward, tapered swelling of seedlings often occurs 4 to 6 months after greenhouse inoculation. Affected seedlings generally die by nine months.

BASEBALL BAT - FIELD

Constriction of five-year-old tree by a rust gall. Note taper of upper gall, but not lower part. This tree died two months after this photograph was taken.

SMOOTH GALL - GREENHOUSE

An example of a SMOOTH GALL. A smooth gall has a "rough" surface on less than 50 percent of the total gall surface. A "rough" surface is darker (purplish) in color than the normal gall surface, and often slightly sunken. It is evidence of periderm formation. This symptom type is best assessed before the bark becomes darkened and rough.

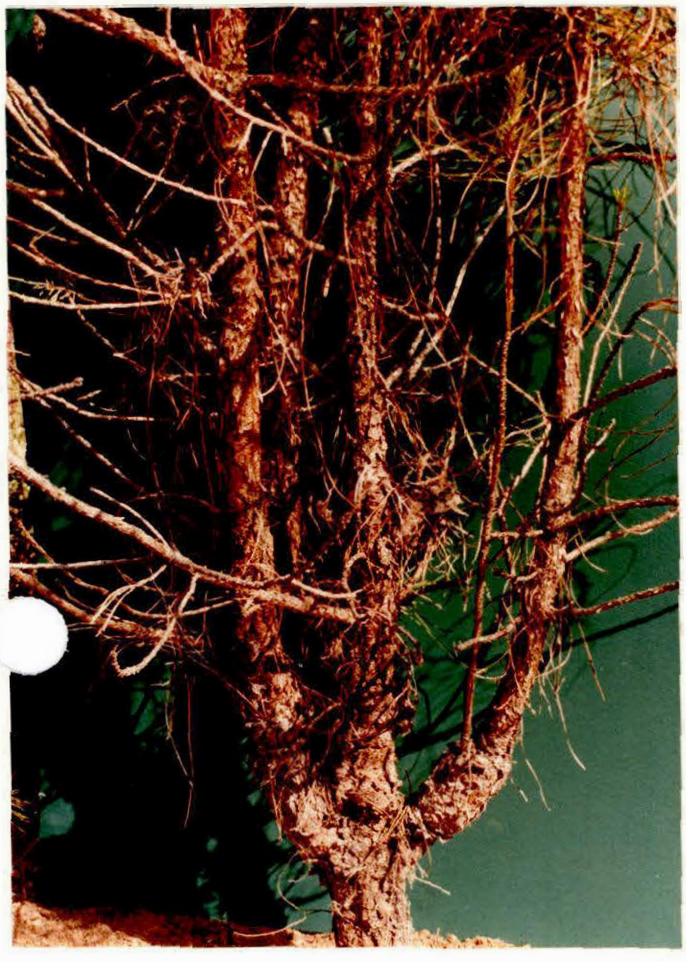
ROUGH GALL - GREENHOUSE

This photograph represents a ROUGH GALL. The area of discoloration covers more than 50 percent of the gall surface, making the gall ROUGH.

BRANCH TO MAIN STEM INFECTION - FIELD

Main stems of actively growing trees can be infected through diseased branches which may be large or small. Branch to stem galls cause sunken wounds when the branch dies.

NON-LETHAL BRANCH INFECTION - FIELD



WITCHES BROOM - FIELD

This type is characterized by a complete loss of apical dominance in the infected tree.

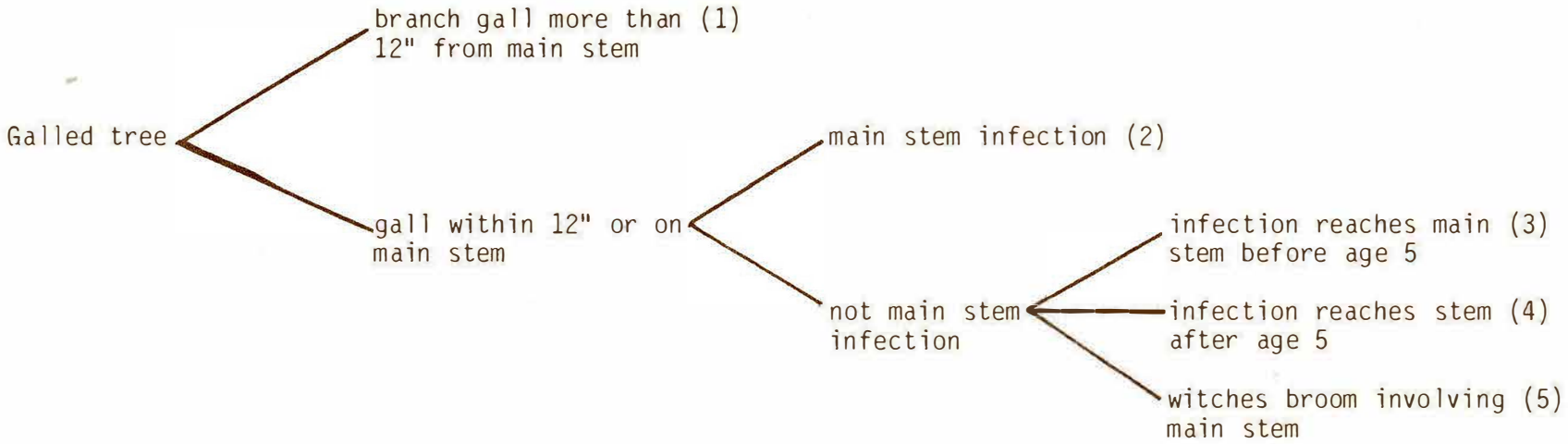
STEM DISTORTION - FIELD

Example of an atypical gall. Can cause twisting and wounding of growing stems.

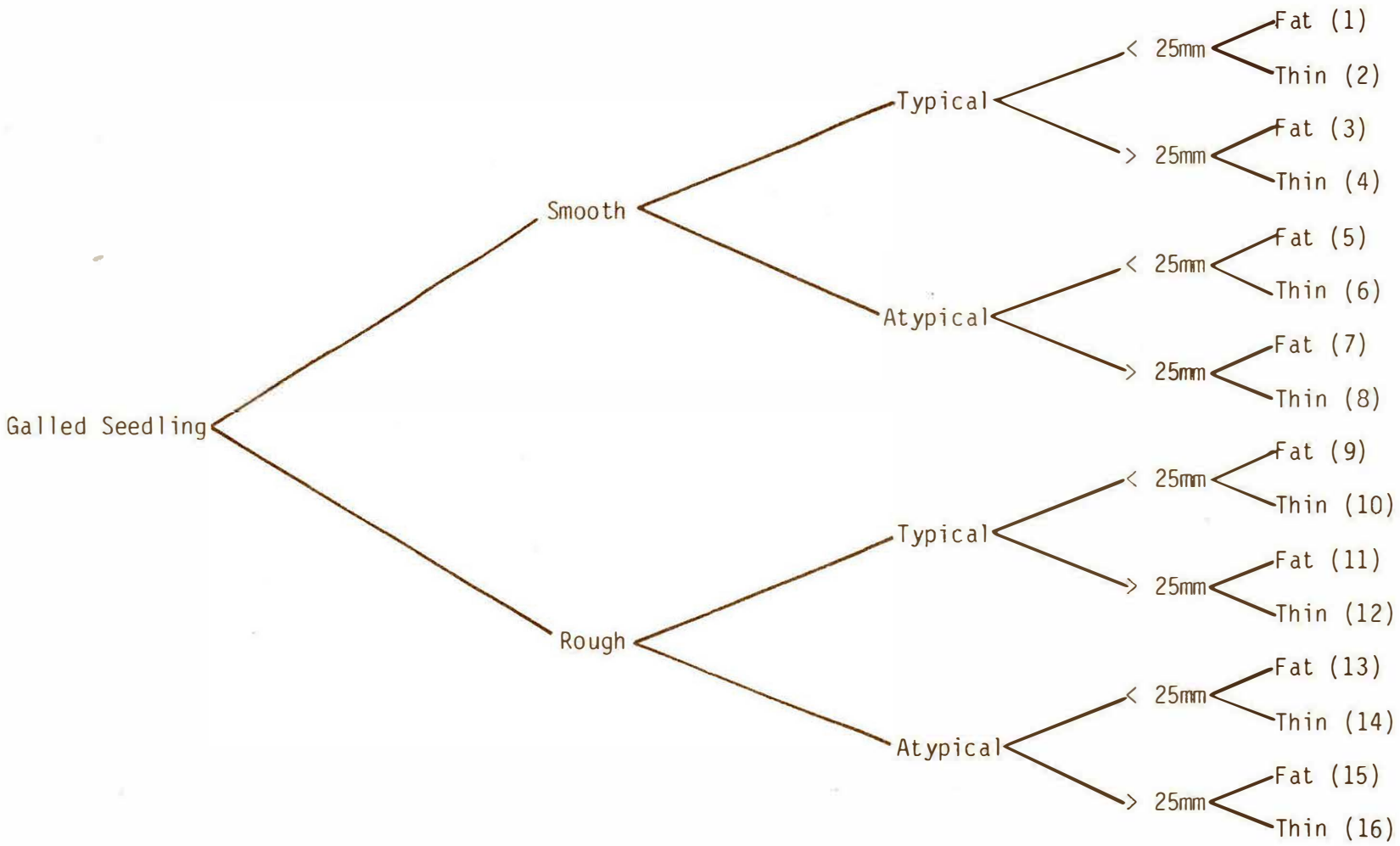
SYMPTOM TYPES FOUND IN GREENHOUSE AND FIELD

Greenhouse	Field
SYMNO	(not seen)
Typical gall	Typical gall
Fat gall	Fat gall
Less than 25mm gall	Small (thin) gall
"Baseball bat" gall	"Baseball bat" gall
Smooth gall	Branch to stem gall
Rough gall	Non-threatening gall (branch gall greater than 300mm from stem)
	"Witches broom"
	Stem distortion

The following diagram shows the gall types for field trees:



The following flow diagram shows all 16 possible gall classifications used at the Resistance Screening Center.



Gen0

Forest Pest Management
Asheville Field Office

Report #83-1-21
August 1983

FUSIFORM RUST: ILLUSTRATION OF DIFFERENT SYMPTOMS IN THE GREENHOUSE AND FIELD

Prepared by: Carlos H. Walkinshaw
Principal Plant Pathologist
Southern Forest Experiment Station
Gulfport, Miss.

Robert L. Anderson
Resistance Screening Center Manager

Approved by: Harold W. Toko
for Harvey V. Toko
Staff Director
Forest Pest Management